

## **IN THE DRAWINGS**

Sheets 1 and 2 were renumbered 2/3 and 2/3 consistent with the addition of a new drawing sheet.

The new drawing sheet, labeled 3/3, was added to present new Fig. 7 in response to a drawing objection. New Fig. 7 shows a lenticular element 21 having different shaped elements.

## REMARKS

Claims 1-20 and 22-23 are pending.

Claim 1 has been amended to clarify that the relative center is laterally shifted, support for which is shown at least in Fig. 6 (showing a respective X and Y axis for displacement of the relative center point by the distance "d") and is disclosed in the specification at page 7, line 30, to page 8, line 4. Additionally, the specification discloses at page 12, lines 9-13, that the shifting occurs across one or both of the X and Y axis, so that "d" is defined by  $d_x$  and  $d_y$ .

Also, Claims 9 and 18 have been amended to clarify that a particular micro-lens 22 of a lenticular element can have a different geometric configuration to achieve a desired effect, being shaped according to either a zone, or on a lens-by lens basis; support for which is found at least in the specification at least at page 7, lines 26-28.

Claim 12 was amended to include some language from the preamble of Claim 1, the features of Claims 2 and 21, as well as the lateral shift supported as explained above for Claim 1. Claim 21 was cancelled.

It is respectfully submitted no new matter has been added by the present amendments.

### I. Objection to the Drawings

New Fig. 7 (ATTACHMENT I) has been added to overcome the general objection to drawings that not all of the elements recited in claims 9 and 18 were shown. New Fig. 7 shows a portion of a particular lenticular element comprising one circular lens and one square lens. Support is also found both in original claims 9 and 18 (claiming lenses being "different from each other"), as well as the portion of the specification at page 7, lines 25-29, and page 13, lines 25-31.

The specification was amended to reflect the new drawing, and reiterates in part the disclosure at page 7, lines 25-29 that the configuration of the mold can be adjusted to direct and shape the light beam with the desired effect on a lens by lens or zone by zone of the optical device. No new matter has been added by the addition of this new drawing, which is based on the original claims and at least the previously-referred to passage in the specification.

It is respectfully requested that the addition of New Fig. 7 (and the amendment to the specification to conform so as to disclose the new drawing) overcomes all grounds of objection. Reconsideration and withdrawal of same is respectfully requested.

II. Rejection of Claims 9 and 18 under 35 U.S.C. §112, second paragraph

Claims 9 and 18 were rejected under 35 U.S.C. §112, second paragraph because the term "different" (from each other) is relative. As discussed in above, claims 9 and 18 have been amended to recite that there is at least one lens having a different geometric configuration within the plurality of micro-lenses to achieve the desired effect for a particular lens. To reiterate, support is found at least in the specification at page 7, lines 25-29, particularly at line 28, and page 13, lines 25-31. Thus, not only can the lenticular element have lenses with different geometric configurations (e.g. circular, hexagonal, square, such as shown in Figs. 3-5, respectively), but each particular lenticular element can have different shaped lenses in zones, or even on a lens by lens basis.

In addition, it is understood by persons of ordinary skill in the art that each micro-lens has a relative center, which is shifted with respect to the relative point of light emission. In the description at page 12, beginning at line 5, it is disclosed that this "embodiment allows to

configure the mold so as to obtain, with micrometric precision, the desired effect of directing and shaping the light beam, even on a lens by lens basis."

According, it is respectfully requested that claims 9 and 18 are in full compliance with 35 U.S.C. § 112, second paragraph. Reconsideration and withdrawal of this ground of rejection are respectfully requested.

III. Rejection of Claims 1-5, 8, 10-17 and 19-21 under 35 U.S.C. § 102(b)

Applicant respectfully traverses the ground of rejection under 35 U.S.C. § 102(b) in view of the article by C.F. Madigan (Improvement of output coupling efficiency of organic light-emitting diodes by backside substrate modification, XP-0009505101, *Applied Physics Letters*, Volume 76, Number 13, 27 March 2000, hereafter "Madigan") disclosed by the Applicant.

Claim 1 recites "each micro-lens has its relative center located laterally shifted with respect to the relative point of light transmission." Fig. 6 shows a micro-lens 22 having a relative center located laterally shifted with respect to the relative point of light emission (19).

Claim 12 recites, "the micro-lenses of said lenticular optical element are positioned laterally shifted with respect to the corresponding crossing point, or pixel, between a positive electrode and a negative electrode."

Page 12, at line 2, discloses "[E]ach micro-lens 22 is centered and oriented so as to be displaced by a distance "d" ... with respect to the relative light source ... so as to create a plurality of light emission points focused in a desired manner by means of the specific design of the lenticular element 21. To be more exact, this shifting of the center of the micro-lens 22 can occur along one of the two main axes, x or y, of the micro-lens 22, and also with respect to both, so that the distance "d" is defined by components  $dx$  and  $dy$ .

From the above description in Fig. 6, it is clear that the shifting mentioned in the present application and claims is in a lateral direction between the center of the lens itself (in other words the median or peak point of the spherical bowl which forms the lens) and the point of light emission, and this shifting is taken on one or both the x and y directions in the plane where the micro-lens lies, i.e. the laying plane of the lenticular element 21, of the transparent substrate 20, etc.

Applicant respectfully submits that Madigan fails to anticipate Claim 1. Madigan refers only to a generic adjustment of the center of the curvature (by the phrase at page 1652, column 2, paragraph 3 that "by adjusting the location of the center of curvature of the surface features, and the shape of the features, the far-field emission pattern can be tuned") and would not be understood by a person of ordinary skill in the art as disclosing the laterally-shifted location recited by Claim 1. The above-quoted disclosure from Madigan makes no reference to possible shifting between the center of each micro-lens and the relative point of light emission.

Additionally, a reading of the note regarding Figure 3 of Madigan clarifies that Madigan refers to an offset between the center of curvature, i.e. the center of the sphere, from which the spherical lens is generated, and the point of light emission (the OLED), and this offset is taken in a direction which is orthogonal to the plane where the lenticular element (having the micro-lenses) lies.

In other words, Madigan suggests to adjust the position of the spherical lens with respect to the relative point of light emission (OLED) to have either the OLED exactly centered on the center of curvature of the sphere from which the lens is obtained ( $d=0$  in the note in Fig. 3), or to have an offset ( $d \neq 0$ ) along a radius orthogonal to the OLED itself and to the plane where the lens lies.

Moreover, in the structure disclosed by Madigan, the lens is placed closer or farther to the point of light emission in order to improve the efficiency of coupling, but it is never laterally shifted in an x or y direction on the plane where the lenticular element lies, in order to focus the light beam extracted from the lenticular element itself in a desired manner.

From the aforementioned explanation, an artisan would understand Madigan as disclosing a technique for improving the emitted efficiency of optical lighting device by adjusting closer or farther the lenses from the relative point of light emission, i.e. creating an offset between the center of curvature of the spherical lens and the OLED.

In contrast, the present claimed invention is directed to a technique to model the emitted beam by laterally-shifting each micro-lens in an x or y direction on its laying plane with respect to the relative point of light emission, in order to improve the extraction efficiency and obtain a desired far-field pattern of the illuminating beam.

To assist the Examiner with appreciating the conceptual differences of the claimed invention over the Madigan reference, we enclose an article written by one of the inventors, Ms. Patrizia Melpignano, published by the Applied Physics Letters in 2006, in which the particular features of the present invention and its advantages, which derive from it, are broadly disclosed (attached as "ATTACHMENT II").

Referring to the last 8 lines of page 1 of ATTACHMENT II, this article discloses that by slightly offsetting the individual elements of the micro-lens with respect to the relative OLED pixel the far-field distribution is obtained by the sum of the overlapping images of each of the OLED pixels.

The article also discloses a demonstration regarding the lateral shifting of each lens with respect to the relative point of light emission (please see the example on the right-hand side of

Fig. 1, where the lighting point is laterally offset with respect to the relative spherical lens) allows to improve the "extraction efficiency of 70% for the integrated micro-optics controlling the light distribution as a Gaussian pattern" (last lines of page 2).

In light of all of the above, Applicant respectfully submits that none of the present claims would have been anticipated by Madigan. Reconsideration and withdrawal of this ground of rejection are respectfully requested.

From the above, it is respectfully submitted the feature of the lateral shift of each micro-lens with respect to the relative point of light emission is neither disclosed nor suggested in the article to Madigan et al or the other documents cited in the Office Action.

#### IV. Rejection of Claims 6, 7, 22 and 23 under 35 U.S.C. §103(a)

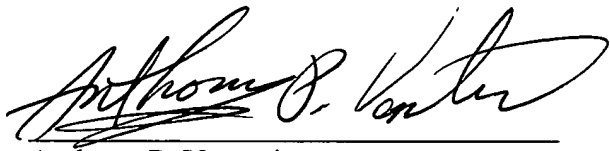
It is respectfully submitted that none of claims 6, 7, 22 and 23 would have been obvious to a person of ordinary skill in the art in view of Madigan, both for the reasons previously discussed to traverse the rejection under 35 U.S.C. §102(b), and because Madigan fails to disclose or suggest a thickness and a lateral size of the micro-lenses suitable for a laterally shifted position with respect to the relative point of the light emission. The reference simply fails to disclose or suggest all of the elements recited in the rejected claims.

V. Conclusion:

In view of the above, it is respectfully submitted that all objections and rejections are overcome. Thus, a Notice of Allowance is respectfully requested.

Respectfully submitted,

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Enclosures:

ATTACHMENT I - New Fig. 7  
ATTACHMENT II

APV/SG

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**ATTACHMENT I - NEW DRAWING SHEETS**

